

**CYTOGENETIC ANALYSES OF CHERNOBYL CLEAN-UP WORKERS**

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We performed biodosimetric analyses of workers involved in clean-up operations following the Chernobyl accident. Blood samples were collected from 188 exposed workers who participated in the cleanup and from 69 subjects living in Russia but not involved in the cleanup activities. The samples were collected between September 1991 and May 1996 and shipped to Livermore for cytogenetic evaluation. Chromosomes 1, 2, and 4 were painted simultaneously with whole-chromosome DNA probes, and at least 1500 metaphase cells (500 cell equivalents) were analyzed for structural aberrations from each subject. The PAINT system was used for the initial classification of all aberrations. Translocations were subsequently evaluated to determine whether they were reciprocal or non-reciprocal, and then enumerated according to the classical method which assumes all translocations are reciprocal. Univariate statistical analyses (including adjustments for age and smoking status) found greater frequencies of chromosome translocations among the exposed compared to controls ( $p \leq 0.0001$ ), regardless of the method of enumerating translocations. The difference in translocation frequencies between clean-up and control subjects was explainable by invoking an average population exposure to  $12 \pm 3$  cGy. This estimate was based on an *in vitro* dose response curve with <sup>137</sup>Cs exposure to human blood, and was obtained in our laboratory with the same painting probes. Differences between clean-up workers and controls were seen for dicentrics and for total acentric fragments. Smoking was also associated with increased translocation frequencies. These results show the feasibility of performing retrospective biodosimetry by painting following low doses of ionizing radiation. Work performed under the auspices of the US DOE by LLNL contract No. W-7405-ENG-48.